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GTP Schäfer Giesstechnische Produkte GmbH
41515 Grevenbroich, DE

(54) Pressure-protected feeder insert

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Applicant:

GTP Schäfer
Giesstechnische Produkte GmbH
Benzstrasse 15
41515 Grevenbroich, DE

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GTP 23500 sch29

Pressure-protected feeder insert

Description

The invention concerns a feeder insert for fitting into a casting mould used for pouring metals, consisting of a body enclosing a feeder cavity and made in an exothermic and/or insulating material, having a wall, a top and a base area containing a feeder aperture. A feeder insert of this type is known, for example, in DE-GM 93 03 392.3.

When feeder inserts of this type are stressed by the pressure applied externally by the compaction of the moulding sand after placing in the casting mould, the problem arises that the feeder cannot completely withstand any pressure peaks that might act on it, resulting in mechanical damage or disintegration of parts of the feeder insert.

This is a particular problem in the region of the base of the feeder with the aperture, especially where feeder inserts are used in conjunction with breaker cores.

The invention is therefore based on the task of protecting a feeder insert, having typical features, from the stresses incurred in the moulding process.

The solution to this task is contained in the patent claims following this description, and also includes beneficial arrangements and alternative forms of the invention.

In its basic concept, the invention prescribes that the feeder insert has a moulded body made from an elastic material that will provide flexibility for the body when subjected to pressure during the moulding process. The additional advantage associated with the invention is that the moulding body made from an elastic material as a component part of the feeder insert yields under the pressure stresses applied to it so that pressure peaks arising during moulding are dissipated and do not act on the body of the feeder insert, thus effectively avoiding mechanical damage to the feeder insert during the moulding process.

According to an initial design version of the invention, provision is made that the moulded body consists of a plate located on the top of the feeder insert, such that the plate is placed on the top and is the same size as the top.

Another design version of the invention can provide that the plate extends beyond the top on all sides.

In an alternative design of the invention, the plate can be set as a flexible moulded body into a recess let into the external side of the top.

According to a further design example of the invention, the moulded body is shaped as a cone set on the top, the advantage of which is that, when filling the mould with sand, the sand is dispersed on the cone, distributing it well around the feeder insert. Equally, the moulded body in the shape of a cone offers a small impact surface only on which pressure stress peaks can act since the lines of force are directed outwards at the feeder insert.

In design versions of the invention, the base surface of the cone can either correspond to the size of the top, or its base can extend beyond the top on all sides.

Another design version can provide for a plate-shaped moulded body located on the top with a design version of a cone-shaped moulded body located on the top, such that the moulded body provided on the top can consist of a plate-shaped component and a cone-shaped component resting on it.

According to a further design example of the invention, the moulded body can also take the shape of an appropriately shaped ring set in the wall of the feeder insert. In this version, the ring can be arranged in various areas of the feeder insert, such as in the central region of the feeder insert but it can be in the region of the transition from the wall of the feeder insert to the top. Alternatively, the moulded body can also be shaped as a plate stretching over the feeder cavity because the part of the plate covering the feeder cavity gasifies when the feeder is used so that the entire feeder cavity is available for use. In a further design example of the invention, the moulded body, shaped either as a ring or a plate, can be placed in a recess formed in the upper end of the wall, leaving a circumferential projecting lip. When pressure is applied, the top firstly presses on the lip surrounding the moulded body which acts as an intentional fracture point and it yields so that the top then acts on the moulded body itself, providing the required flexibility.

If a feeder insert with a breaker core in its base region is used, the annular moulded body, formed from an elastic material, can be arranged also between the body of the feeder insert and the breaker core.

One design version of the invention calls for the use of adhesive to join the particular moulded body with the body of the feeder insert, but other attachment means can also be used.

Preferably, the moulded body, whichever is used, consists of a plastic with elastic mechanical properties, where Styropor is particularly well suited for the moulded body involved since it gasifies when the feeder is used and the moulded space remaining after gasification is further insulated.

Mineral fibre with a density of less than 0.4 gm/cm^3 is another material which can be used.

Finally, according to another design of the invention, the top itself can be shaped to form the moulded body which can flex when pressure is applied during the moulding process.

The drawings illustrate different designs of the invention, which are explained below:

Figure 1	A feeder insert provided with a breaker core and a plate located in the top region,
Figure 2	Another design version of the invention corresponding to Figure 1,
Figure 3	A further design version of the invention corresponding to Figure 1,
Figure 4	A design version of the invention with a moulded body in the shape of a cone,
Figure 5	Another design version of the invention corresponding to Figure 4,

Figure 6 The arrangement of an annular moulded body in the wall of a feeder insert,

Figure 7 Another design version of the invention corresponding to Figure 6,

Figure 8 A further design version of the invention corresponding to Figure 6,

Figure 9 A further design version of the invention corresponding to Figure 6.

As can be seen in the basic version in Figure 1, the feeder insert designated by 10 has a body consisting of a wall 11 enclosing a feeder cavity, and top cover 13, on the underside of which is a recess 14 pointing down towards the feeder cavity 12 to accept the tip of a forming mandrel to hold the feeder insert on the pattern. Furthermore, the body of the feeder insert 10 includes a base region 15 into which the feeder cavity 12 extends into feeder aperture 16 at which point a breaker core 17 is arranged according to the design example shown. The illustrated feeder insert 10 can also be used without a breaker core 17, in which case the base region 15 is shaped such that a feeder aperture 16 is arranged in the base region 15 according to Figure 1.

In the case of the design version illustrated in Figure 1, the moulded body is formed from an elastic material as a plate located on the top 13 where the dimensions of the plate and the top are the same.

As is also clear from the drawing, the pressure forces acting on the feeder insert 10 during the moulding process are first borne by the plate 18 which can deform under this action so that any pressure peaks occurring will not result in mechanical damage or disintegration of the feeder insert 10.

In the design version of the invention shown in Figure 2, the base of the plate is enlarged such that the plate 18 now extends beyond the top 13 in all directions.

Figure 3 shows an alternative design of the invention in which the plate 18, made from an elastic material, is inset into a recess 19 let into the top 13.

Figures 4 and 5 illustrate another shape for the flexible moulded body, made from an elastic material, which takes the shape of a cone 20 in Figure 4 with a base matching the size of the top 13. The advantage of the cone 20 is that, when filling the mould with sand, the sand is diverted on the cone, avoiding stress on the top region of the feeder insert during filling. Furthermore, the cone 20 presents less surface contact area for the pressure forces acting on the feeder insert 10. The design example shown in Figure 5 illustrates a cone-shaped moulded body 21 consisting of a plate-shaped base portion with a conical shape rising from it.

Figures 6 to 8 show design versions featuring an annular moulded body 22 with is set into the wall 11 of the feeder insert 10 making all of the feeder insert 10 inherently flexible. Using this system, the ring 22 can be arranged in the central region of the feeder insert 10, as in Figure 6, while Figure 7 shows a version where the ring 22 is arranged as a moulded body made from an elastic material situated in the upper region between the wall 11 and the top 13.

Finally, Figure 8 illustrates a design example in which the ring 22 is arranged between the body of the feeder insert 10 and the breaker core 17 belonging to it.

In the design version shown in Figure 9, the ring 22 is placed in a recess 25 formed on the upper side of the wall 11 towards the top 13, leaving an outer circumferential lip 26. In this version, the lip 26 acts like a fracture point since the top contacts and crushes the lip 26 under pressure, and, as the lip 26 continues to crush, the load is transferred to the moulded body 22 set in the recess 25.

Preferably, the moulded bodies shown individually in the figures should be attached by adhesive to the feeder insert or its components, in which Styropor or mineral fibre with density of less that 0.4 gm/cm^3, for example, is used as a material for the relevant moulded body.

According to the invention, it is advisable to keep the thickness of the relevant moulded bodies to between 0.1 and 5 times the thickness of the top, in which the thickness of the top is defined as the overall height of the feeder between the base on which it stands on the pattern and the upper surface of the top, less the internal height of the feeder cavity. However, the thickness of the moulded body in question should be dimensioned in each case in relation to the material being used such that the forces acting in the region of the moulded body during the moulding process can be dissipated.

The features of the subject matter in these documents divulged in the preceding description, the patent claims and the drawings may be regarded as essential both individually and in any combination for the realisation of this invention in its various design forms.

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GTP Schäfer
Giesstechnische Produkte GmbH
Benzstrasse 15
41515 Grevenbroich, DE

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Patent claims

1. The invention concerns a feeder insert for fitting into a casting mould used for pouring metals, consisting of a body enclosing a feeder cavity and made in an exothermic and/or insulating material, having a wall, a top and a base area containing a feeder aperture, characterised in that the feeder insert (10) has a moulded body (18, 20, 21, 22) made in an elastic material so that it will flex when subjected to pressures during the moulding process.
2. A feeder insert in accordance with claim 1, characterised in that the moulded body consists of a plate (18) located on the top (13).

3. A feeder insert in accordance with claim 2, characterised in that the plate (18) is located on the top (13) and is the same size as the top (13).

4. A feeder insert in accordance with claim 2, characterised in that the plate (18) is located on the top (13) and extends beyond the top (13) on all sides.

5. A feeder insert in accordance with claim 2, characterised in that the plate (18) is located in a recess (19) formed in the top (13).

6. A feeder insert in accordance with claim 1, characterised in that the moulded body is in the form of a cone (20) located on the upper part of the top (13).

7. A feeder insert in accordance with claim 6, characterised in that the base of the cone (20) is the same size as the top (13).

8. A feeder insert in accordance with claim 6, characterised in that the base of the cone (20) extends beyond the top (13) on all sides.

9. A feeder insert in accordance with claims 2 to 8, characterised in that the moulded body (21) consists of a plate-shaped component and a cone-shaped component resting on it.

10. A feeder insert in accordance with claim 1, characterised in that the moulded body is formed as a ring (22) set in the wall (11) of the feeder insert (10) and extending the feeder cavity (12) in its central region.

11. A feeder insert in accordance with claim 1, characterised in that the moulded body is formed as a plate set in the wall (11) of the feeder insert (10) and extending over the feeder cavity (12).

12. A feeder insert in accordance with claims 10 or 11, characterised in that the ring (22) is arranged in the central region of the feeder insert (10).

13. A feeder insert in accordance with claims 10 or 11, characterised in that the ring (22) is arranged at the transition from the wall (11) of the feeder insert (10) to its top (13).

14. A feeder insert in accordance with claims 10 or 11, characterised in that the ring (22) is placed in a recess (25) formed in the upper end of the wall (11), leaving a circumferential projecting lip (26).

15. A feeder insert in accordance with claims 10 or 11, in which the feeder insert is provided with a breaker core, characterised in that the ring (22) is arranged between the base region (15) and the breaker core (17).

16. A feeder insert in accordance with claims 1 to 15, characterised in that the moulded body (18, 20, 21, 22) is attached to the feeder insert (10) by means of an adhesive.

17. A feeder insert in accordance with claims 1 to 16, characterised in that the moulded body (18, 20, 21, 22) is made from a plastic with elastic properties.

18. A feeder insert in accordance with claim 17, characterised in that the moulded body (18, 20, 21, 22) is made from Styropor.

19. A feeder insert in accordance with claims 1 to 16, characterised in that the moulded body (18, 20, 21, 22) is made from a mineral fibre with a density of less than 0.4 gm/cm^3.

20. A feeder insert in accordance with claims 1 to 19, characterised in that the top of the feeder insert (10) itself forms the moulded body.

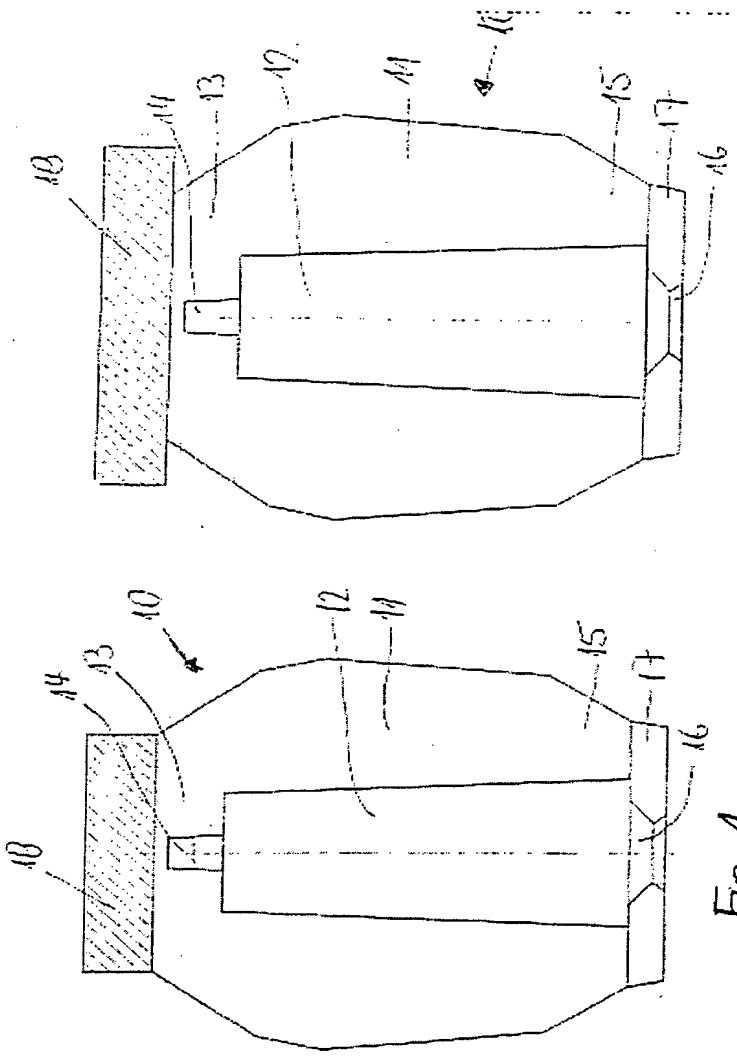

Fig. 1

Fig. 2

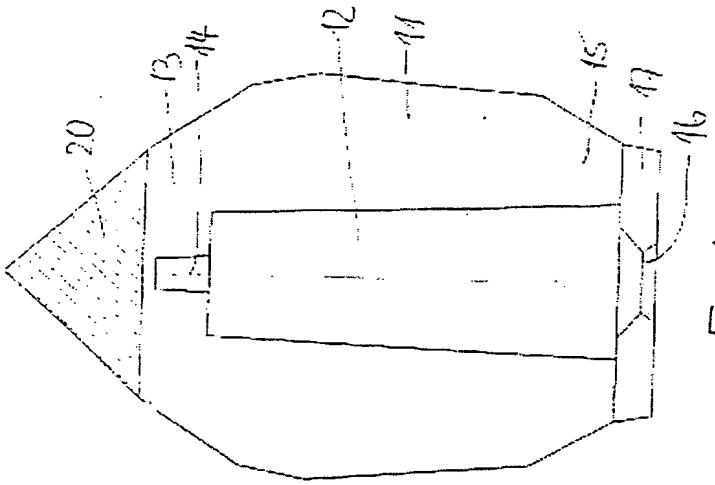

Fig. 4

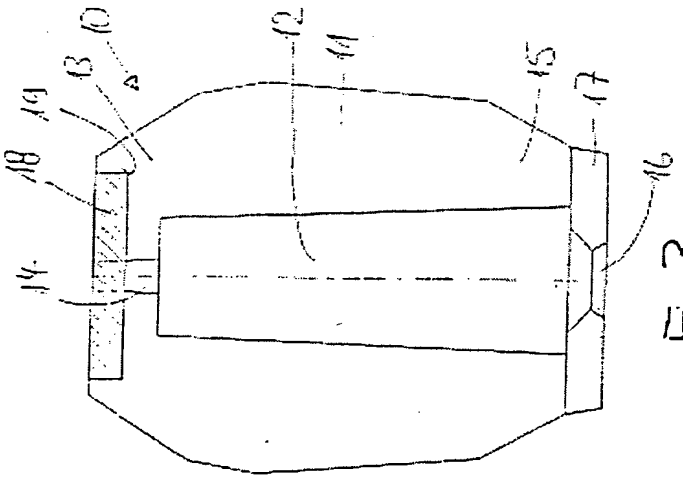

Fig. 3

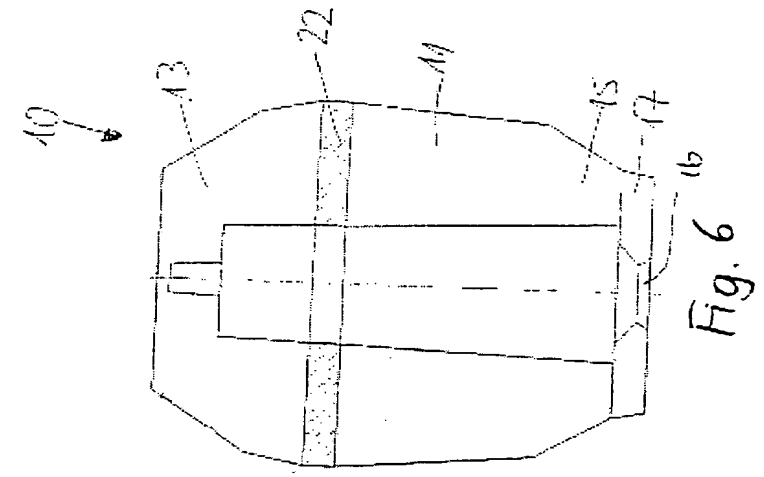

Fig. 6

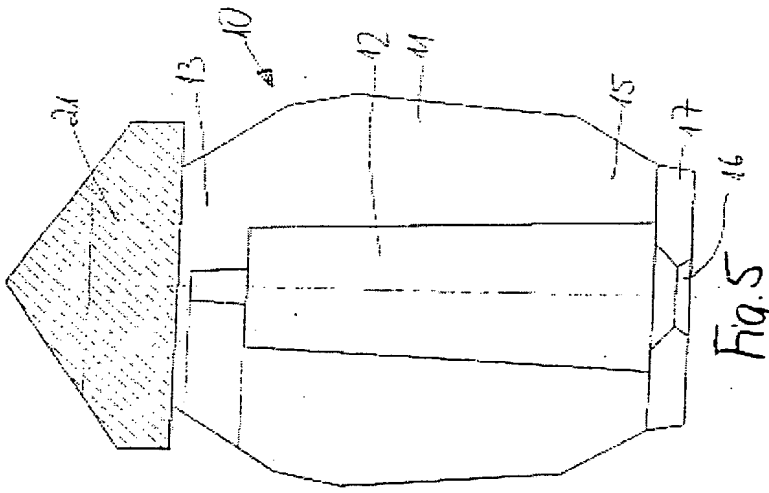

Fig. 5

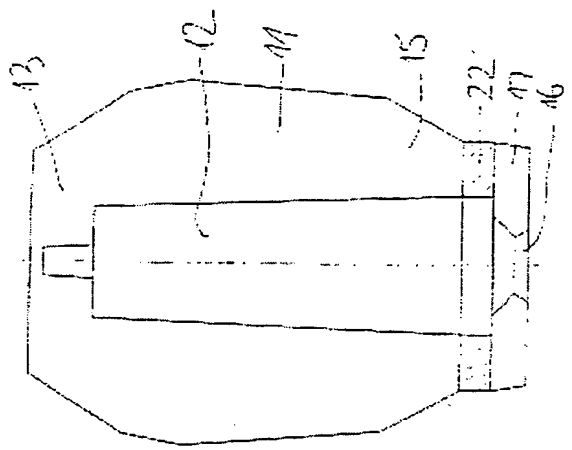

Fig. 8

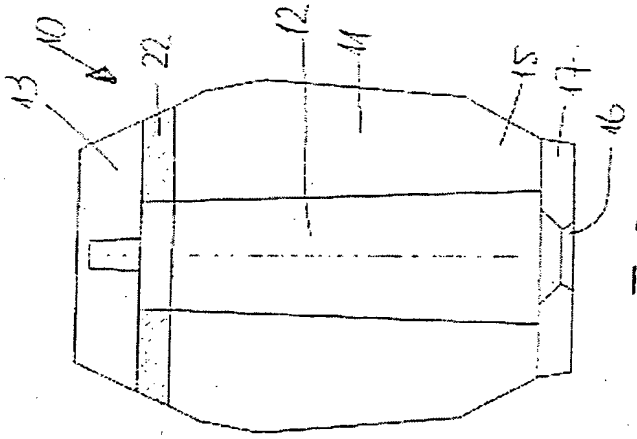

Fig. 7

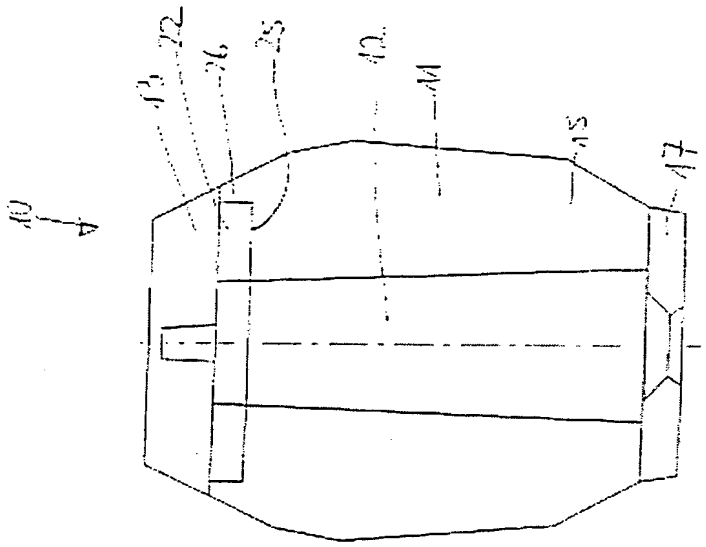

Fig. 9